

Remarks

Applicants appreciate the thorough examination of the present application as evidenced by the final Office Action mailed May 17, 2002 (the Action). Applicants respectfully submit that this Amendment raises no new issues and respectfully request entry of this Amendment and allowance of the present application. Alternatively, Applicants respectfully request entry of this Amendment as narrowing the issues for further consideration.

The specification has been objected to for failing to include reference numerals 70, 80, 90, 100, and arrows x and y on Figure 1. Claims 1-2, 4-15, 23, and 65-66 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,922,493 to Humphrey Jr. et al. Claims 24-28, 30-38, 46, and 69-70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey Jr. et al. in view of U.S. Patent No. 4,692,381 to Pecsok. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey Jr. et al. in view of U.S. Patent No. 3,879,505 to Boutillier et al. Claim 29 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey Jr. et al. in view of Pecsok as applied to Claims 24-28, 30-38, and 46 and further in view of Boutillier et al. Claims 67 and 71 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey Jr. et al. in view of U.S. Patent No. 6,284,412 to Minakata et al. Applicants address each of the objections and rejections below.

I. Status of the Application after Amendment

Claims 1-15, 23-38, 46, and 65-122 are pending. Applicants appreciate the indication by the Examiner that Claims 73-122 are allowed. Applicants have amended Claim 94 to provide proper dependency.

New Claims 123-142: To facilitate claim renumbering should the application be allowed, Applicants have rewritten Claims 1-15, 23, and 65-68 as new Claims 123-142.

New Claims 143-148: Independent Claims 143 and 145 are similar to independent Claim 1 (now Claim 123) and independent Claims 146 and 148 are similar to independent

Claim 24. For the convenience of the Examiner, Applicants provide Claims 143, 145, 146, and 148 as marked-up versions of Claims 1 and 24.

143. (New) A method of producing a foamed material, said method comprising:

contacting a mixture comprising a first thermoplastic polymer and a second thermoplastic polymer with a blowing agent, **[wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer,]** wherein the first thermoplastic polymer is semicrystalline and the second thermoplastic polymer is amorphous, and wherein the mixture of thermoplastic materials is amorphous; and

subjecting the mixture to conditions sufficient to create a thermodynamic instability in the mixture to foam the mixture, wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein having an average size ranging from **[above about 0 to about 100]** about 0.1 to about 50 microns.

145. (New) A method of producing a foamed material, said method comprising:

contacting a mixture **[comprising a first thermoplastic polymer and a second thermoplastic polymer with a blowing agent, wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer]** of thermoplastic polymers consisting essentially of PVDF and PMMA, wherein the mixture of thermoplastic materials is amorphous; and

subjecting the mixture to conditions sufficient to create a thermodynamic instability in the mixture to foam the mixture, wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein having an average size ranging from **[above about 0 to about 100]** about 0.1 to about 50 microns.

146. (New) A method of extrusion processing a mixture of thermoplastic materials, said process comprising:

introducing at least two thermoplastic polymers into an extruder barrel, the at least two thermoplastic polymers comprising a first thermoplastic polymer and a second thermoplastic polymer, **[and wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer]** wherein the first thermoplastic polymer is semicrystalline and the second thermoplastic polymer is amorphous, and wherein the mixture of thermoplastic materials is amorphous;

heating the mixture of thermoplastic materials to provide a molten blend thereof;

contacting the molten blend of thermoplastic materials with a blowing agent; and

subjecting the blend to conditions sufficient to create a thermodynamic instability in the blend to foam the blend, wherein the foamed blend has a percent crystallinity lower than the first thermoplastic polymer;
wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein having an average size ranging from **[above about 0 to about 100] about 0.1 to about 50** microns.

148. (New) A method of extrusion processing a mixture of thermoplastic materials, said process comprising:

introducing **[at least two thermoplastic polymers] a mixture of thermoplastic polymers consisting essentially of PVDF and PMMA** into an extruder barrel[, **the at least two thermoplastic polymers comprising a first thermoplastic polymer and a second thermoplastic polymer, wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer]** wherein the mixture of thermoplastic materials is amorphous;

introducing into an extruder barrel, wherein the mixture of thermoplastic materials is amorphous;

heating the mixture of thermoplastic materials to provide a molten blend thereof;

contacting the molten blend of thermoplastic materials with a blowing agent; and

subjecting the blend to conditions sufficient to create a thermodynamic instability in the blend to foam the blend, wherein the foamed blend has a percent crystallinity lower than the first thermoplastic polymer;

wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein having an average size ranging from **[above about 0 to about 100] about 0.1 to about 50** microns.

Applicants respectfully submit that new Claims 143-148 do not present new issues.

New Claims 149-158: Applicants have added new independent Claims 149 and 154, which contain all of the recitations of allowed Claims 73 and 98, respectively, and further include the recitations "wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein having an average size ranging from above about 0 to about 500 microns." Support for these recitations can be found at page 4, lines 28-32. Support for new dependent Claims 150, 152, 155, and 156 can also be found at page, lines 28-32. New dependent Claims 153, 154, 157, and 158 are similar to allowed Claims 80, 84, 105, and 111, respectively. Applicants respectfully submit that, as with allowed Claims 73 and 98, new Claims 149-158 are patentable over the cited references.

II. Informalities in Specification Have Been Addressed

The specification has been objected to because "the description of Figure 1 on pp. 17-18 indicates parts 70, 80, 90, 100, and arrows x and y. However, labels for the indicated parts and arrows are not present on Figure 1." Applicants submit concurrently herewith a corrected Figure 1 showing reference numerals 70, 80, 90, 100, and arrows x and y. Upon receipt of a Notice of Allowance, Applicants will submit formal drawings. Applicants respectfully request that these objections be withdrawn.

III. Claim 1 (Rewritten as Claim 123) is Patentable Over Humphrey

Claims 1-2, 4-15, 23, and 65-66 (rewritten as Claims 123-140) stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,922,493 to Humphrey Jr. et al. (Humphrey). The Action states, "Support for this rejection can be found in the Office action dated 11/28/01, paragraphs 14-17. Additionally, the reference teaches cell diameters of about 0.1-100." Paragraph 16 of the previous Office Action states that:

[Humphrey] does not exemplify making porous foamed materials having a plurality of distinct voids. [Humphrey] does suggest that closed-cell porous foams and foams having both open and closed cells may be formed by the invention (col.4 lines 53-57), noting that the mobility of electrolyte is increased with an open structure. One skilled in the art would recognize that including amounts of closed cells in the foams would provide a means for controlling the mobility of electrolyte. It is thus the examiner's position that it would have been prima facie obvious to provide closed cells within the porous structure to control the mobility of the electrolyte and thus control the conductivity of the system.

Applicants respectfully traverse these rejections.

To establish a prima facie case of obviousness, the prior art reference or references when combined must teach or suggest *all* the recitations of the claim, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. § 2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. M.P.E.P. § 2143.01, citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). To support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of

references. *In re Dembiczak*, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The Court of Appeals for the Federal Circuit has also stated that, to support combining or modifying references, there must be **particular** evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, **would have selected these components for combination in the manner claimed**. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000). Respectfully, as will be discussed below, the Official Action fails to meet the requirements for a showing of obviousness under § 103.

In paragraph 16, the Office Action dated November 28, 2001 (the previous Office Action) admits that Humphrey does not teach making porous foamed materials having a plurality of distinct voids, as recited in Claim 1 (now Claim 123). Despite this insurmountable shortcoming, the Office Action appears to assert that one skilled in the art would be motivated by the disclosure of Humphrey to devise a way to make such foamed materials. In view of this alleged motivation, the Office Action appears to conclude that the recited methods of Claim 1 (now Claim 123) would have been *prima facie* obvious. Applicants respectfully submit that this argument is flawed.

As admitted by the previous Office Action, **Humphrey fails to teach one skilled in the art how to make porous foamed materials having a plurality of distinct voids**. Even if Humphrey provides a motivation to make such porous foamed materials, Humphrey still fails to teach how to make porous foamed materials having a plurality of distinct voids. The Patent Office has not shown, with clear and particular evidence, how one skilled in the art could modify Humphrey's teaching of methods for making open-celled foams to arrive at the methods recited in Claim 1 (now Claim 123). Accordingly, Applicants respectfully submit that Claim 1 (now Claim 123) is patentable over Humphrey. For at least the foregoing reasons, Applicants respectfully request that the rejection of Claim 1 (now Claim 123) over Humphrey be withdrawn. For at least similar reasons, Applicants respectfully submit that Claim 24 is patentable over Humphrey in view of Pecsok and request that this rejection be withdrawn. Applicants further submit that the claims that depend from Claim 1 (now Claim 123) and Claim 24 are, at a minimum, patentable by virtue of their dependency from patentable independent claims, and request that these rejections be withdrawn.

IV. New Claims 143-148 Are Patentable Over the Cited References

New Claims 143-148 are patentable over the cited references for the reasons described in Section II above. Applicants further submit that New Claims 143-148 are further patentable over the cited references because each of these Claims recites "wherein the mixture of thermoplastic materials is amorphous."

The previous Office Action, at paragraph 17, states that:

Humphrey indicates the conductivity is inversely related to the crystallinity of the PVDF (col. 7, lines 46-52). Therefore, it is the examiner's position that it would have been prima facie obvious to form a polymer blend having any amount of crystallinity to produce a foam with the desired conductivity. Since Humphrey indicates a desire to improve conductivity, it would have been prima facie obvious to form an amorphous blend to increase conductivity.

The previous Office Action appears to assert that Humphrey provides no lower limit to the level of crystallinity of the blend, and that, as a result, an amorphous blend would be obvious.

However, contrary to the assertions of the previous Office Action, Humphrey states:

Since conductivity is inversely related to crystallinity of the polyvinylidene fluoride polymer, it has been determined that copolymers of vinylidene fluoride with about 7 to about 25% hexafluoropropylene sufficiently reduces the crystalline structure of the polymer without sacrificing mechanical properties so that acceptable ionic conductivity effects of the polymer can be obtained. (col. 7, lines 46-52) (emphasis added).

Thus, Humphrey does place lower limits on the level of crystallinity of the blend. Humphrey teaches that a reduction of the crystalline structure to promote ionic conductivity must be balanced with the need for acceptable mechanical properties. Accordingly, Applicants submit that the teachings of Humphrey, when taken in their entirety, do not render obvious the methods recited in new Claims 143-148, wherein the mixture of thermoplastic materials is amorphous. For at least the foregoing reasons, Applicants respectfully submit that new Claims 143-148 are patentable over the cited references.

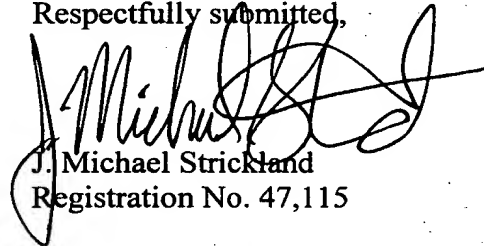
V. Conclusion

Applicants respectfully submit that this Amendment raises no new issues and respectfully request entry of this Amendment and allowance of the present application. Alternatively, Applicants respectfully request entry of this Amendment as narrowing the

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issues for further consideration. The Examiner is encouraged to direct any questions regarding the foregoing to the undersigned, who may be reached at (919) 854-1400.

Respectfully submitted,


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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: BOX AF, Commissioner for Patents, Washington, DC 20231, on July 17, 2002.



Monica L. Croom

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TECHNICAL

Version with Markings to Show Changes Made

In the Claims:

Please amend Claim 94 as follows:

94. (Amended) The method according to Claim 74 [24], wherein the blowing agent is selected from the group consisting of inorganic agents, organic blowing agents, and chemical blowing agents.

* * * *END* * * *

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